A NEW NON-MONETARY METRIC FOR ENVIRONMENTAL BENEFITS

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Presentation Objectives:

- Describe the need and issues
- Describe the metric
- Summarize attributes
- Future directions

For Corps Projects:

- Authorized to restore ecosystems to restore EQ
- EQ is defined by enjoyment and heritage
- The justifying benefit must not be economic
- The benefits metric must apply across plans
- Different metrics are allowed among projects
- Many incommensurate metrics have been used
- Cannot simply sum-up benefits across projects

For Corps Restoration Program:

- Program-area objectives are required by GPRA
- Projects are ranked for budget priority
- Rank is based on benefit contribution to objectives
- A commensurate measure of benefit is needed
- No project metric was adequate to task
- A new metric was first developed for 2004 budget

Issues:

- Vague project objective and metric relationships
- Inconsistent project/program perception of value
- Ecosystem restoration program is growing
- Planning process has been slowed
- Probable CW program inefficiency
- Possible CW program ineffectiveness

The basic metric concept is a Biodiversity Security Index based on specices status:

$$BSI = \sum_{S=1\ldots n} wG$$

G **= Indicator species conservation status (G1-GX)**

w **= Policy determined weight**

S **= Indicator species**

NATURESERVE SECURITY STATUS:

GX PRESUMED EXTINCT

GH POSSIBLY EXTINCT (WATCH)

G1 GREATLY IMPERILED

G2 IMPERILED

G3 INSECURE

G4 GENERALLY SECURE (WATCH)

G5 SECURE

An advanced metric that includes community distinctiveness and planning cost:

$$BSI = \sum_{s=1}^{n} \frac{(wD)}{(wG)}$$

G = indicator species conservation status (G1-GX)

w = policy determined weights

D = indicator species distinctiveness

S = indicator species

TABLE 1. Example of basic calculations to determine a biodiversity security index score.

POPULATION /COMMUNITY	SECURITY STATUS	POLICY WEIGHT	DISTINCT -ION INDEX	POLICY WEIGHT	SPECIES SCORE
SPECIES 1	G2	2	0.500	1	1.000
SPECIES 2	G5	0			
SPECIES 3	G5	0			
SPECIES 4	G3	5	0.020	1	0.100
SPECIES 5	G2	2	0.005	1	0.010
SPECIES 6	G3	5	0.110	1	1.550
SPECIES 7	G4	1	0.009	1	0.009
SPECIES 8	G5	0			
SPECIES 9	G5	0			
SPECIES 10	G5	0			
SPECIES 11	GH	0			
BIODIVERSITY SECURITY INDEX SCORE					1.6596

TABLE 2. Policy weighting effects for different biodiversity security policies.

CONSERVATION STATUS	POLICY WEIGHTING EXAMPLES			
	ANY NATIVE SPECIES	SECURE IN PROPORTION TO NEED	SECURE IMPERILED SPECIES	SECURE VULNERABLE SPECIES
PRESUMED GX EXTINCT	0	0	0	0
POSSIBLY GH EXTINCT	12	0	10	0
CRITICALLY G1 IMPERILED	12	48	40	0
IMPERILED G2	12	16	20	10
VULNERABLE G3	12	4	0	40
GENERALLY G4 SECURE	12	1	0	20
SECURE G5	12	0	0	0
TOTAL	72	69	70	70

TABLE 3. Emphasizing vulnerable species in different communities.

CONSERVATION STATUS	HYPOTHETICAL COMMUNITIES							
	COMMUNITY 1		COMMUNITY 2		COMMUNITY 3		COMMUNITY 4	
	SP #	SCORE	SP #	SCORE	SP #	SCORE	SP #	SCORE
GX	1	0	0	0	1	0	0	0
GH	3	0	1	0	2	0	0	0
G1	5	0	30	0	2	0	2	0
G2	18	180	30	300	4	140	9	90
G3	35	1400	25	1000	11	440	45	1800
G4	30	600	20	400	8	160	85	1700
G5	45	0	32	0	7	0	125	0
TOTAL	137	1200	138	1700	45	740	267	3590

The most advanced metric for estimating increment of ecosystem security added:

$$BSI = \sum_{S=1\ldots n} \frac{h(wR)(wD)(wG)}{(A1-A0)}$$

A1 = final number of viable population units for each species

A0 = initial number of viable population units for each species

S = species

C = project cost

w = policy weight

D = distinctiveness multiplier

R = multiplier for risk of not succeeding

h = indicator for habitat threat (0 or 1)

Metric Attributes:

- Seems consistent with authority & policy
  - indicates value added securing natural heritage
  - excludes all value added from present use
  - measures contribution to the NER objective
- Is commensurate over projects & program
- Seems scientifically acceptable in principle
- May not capture all non-economic value
- May not be accepted by Corps culture

Future Directions:

- Scientific workshop review & improvement
- Policy workshop review & improvement
- Quantification of risk term in metric
- Forecasting population establishment
- Policy weighting workshops
- Case studies
- Development (test application)
- Training/expert support